

**TO ASSESS THE VALUE OF FINE NEEDLE
ASPIRATION CYTOLOGY (FNAG) IN
DIAGNOSIS OF VARIOUS TUMOURS**

THESIS
FOR
MASTER OF SURGERY
(GENERAL SURGERY)




BUNDELKHAND UNIVERSITY
JHANSI (U. P.)

C E R T I F I C A T E

Certified that the research work entitled
" TO ASSESS THE VALUE OF FINE NEEDLE ASPIRATION CYTOLOGY
(FNAC) IN DIAGNOSIS OF VARIOUS TUMOURS", which is being
submitted as thesis for M.S.(General Surgery) examination
of Bundelkhand University, 1989, by Dr.Lalit Chandra Punetha
has been carried out in the department of Surgery, M.L.B.
Medical College, Jhansi.

He has put in the necessary stay in this
department as per University regulations.


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submitted as thesis for M.S.(General Surgery) examination
of Bundelkhand University, Jhansi 1989, has been carried
out by Dr. Lalit Chandra Punetha under my supervision and
guidance. The techniques described were undertaken by the
candidate himself.


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(GUIDE)

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Jhansi 1989, was carried out under my personal supervision
and guidance. Examination of patients was done by candidate
himself and the observations recorded have been checked by
me time to time.

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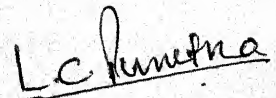
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I dedicate this work to the love, understanding and patience of my parents and other family members which has sustained me throughout.

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(LALIT CHANDRA PUNETHA)

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INTRODUCTION

INTRODUCTION

Fine needle aspiration cytology or FNAC as it is called is the most recent and reliable, yet easy diagnostic tool in the hands of modern surgeon. This inexpensive, quick technique has already revolutionised the diagnosis and management of various neoplastic and inflammatory disorders, thus obviating the need of alternative procedures like tissue biopsy, which is both time consuming and risky (Trett & Randall 1979).

The technique requires aspiration of cells obtained by fine needle under vacuum, supplied by attached syringe. The specimen so obtained consists of minute quantity of tissue or fluid, cells so obtained are stained and studied under microscope.

Innumerable clinical trials and papers has established the sensitivity and discriminative value of this technique. No part, organ or lump of the body is inaccessible to this method. Smears have been taken from pancreas, adrenal, carotid body and even brain and other parts of body which are considered to be quite risky for tissue biopsy. (Conley 1956, Lawrence et al 1988).

This procedure holds much importance in cases where repeated biopsy have to be performed at fixed periods to see the effect of therapy or for staging of malignancies.

To accept the value of FNAC fine needle aspiration cytology, the clinician must overcome his prejudice that passing a thin needle in to a malignant lesion will surely spread the tumour this objection has not been substantiated in studies of thousands of cases.

Those of us who function as thoughtful clinicians find that we are increasingly dependant on a greater variety of laboratory and radiographic sophistication to reach on diagnostic and therapeutic conclusion. Fine needle aspiration cytology (FNAC) is a cost effective clinical tool.

The application of this simple inexpensive technique has had a profound effect on profile of surgery in institution all over the world. Today there is no area of body which has been left virgin by this procedure. Therefore add to or to share the experience of world medical people we proposed to under take this following study to assess the value and significance of this technique in our set up where ever incisional or excisional biopsy facilities are not available berring medical colleges or big hospitals.

AIMS AND OBJECTIVE

1. To assess its value as a diagnostic tool.
2. To assess its value in deep seated lesion in respect to other wise considered potential complications.
3. To consider the need of reemphasising for acceptance of this technique as a routine procedure.
4. To assess the value of this technique in respect to the poor medical facilities available in our country in rural areas.



REVIEW OF LITRATURE

REVIEW OF LITERATURE

Fine needle aspiration cytology, is a relatively new technique which paradoxically has gone back to first principles and undated an earlier art. (Zajick & Lowhagen).

The term aspiration biopsy cytology (ABC) used in Sweden by those who developed the technique and have established its value during many years describes fine needle aspiration, a simple innocuous procedure readily repeated and well tolerated without anaesthesia, with subsequent cytological examination of smeared preparations. Though used in Sweden for 30 years ABC is only now becoming more widely applied. Its value depends on the quality of the sample, which is related to experience, and on the aptitude of the cytologist. It is the most useful component of clinical tissue cytology or nonexfoliative cytology defined by Bamforth (1966), " The examination of cells obtained by needle or drill biopsy in solid organs or tissue masses or from cut surface of such material freshly removed by surgical biopsy ".

Ward (1912) used fine needle aspiration cytology to examine enlarged lymphnodes for lymphoma. Guthrie (1920) first used lymph node aspiration on a systematic basis and the method was pursued both in America (Martin & Ellis, 1934).

Pioneers in U.K. include Dudgeon and Patrick (1927) and Dudgeon and Barret (1934) who achieved an accuracy of 98.6% in diagnosis of breast carcinomas.

Papanicolaou the father of exfoliative cytology, and Martin and Ellis and Stewart, the conjoint series of ABC, conducted their cellular studies and published their preliminary findings. Both techniques were virtually neglected for several decades. Then, while exfoliative procedures were adopted in the United States, fine needle aspiration cytology aroused most interest particularly in Scandinavia, and isolated centres in north & south America.

Gibson and Smith (1957) published their report on fine needle aspiration cytology of breast tumours, and more recently Webb (1970) of Bistol had a good report of the technique.

Ferguson (1930) study of Prostatic aspirates and report of Graver & Binkley (1936) report on pulmonary aspirates. There were papers on thyroid and salivary glands aspirates by Soderstrom (1930) and on breast by Cornillot and Verhaegne (1955) as well as review by Smetana Godwin and Smith et al.

Earlier fear of 'Seeding' tumour cells along with the fine needle aspiration path way have been shown to be unfounded, with no statistical evidence of this everhaving occurred. (Baggell et al 1971, Zajicek, 1979).

Although aspiration biopsy has been faithfully practised by a small band of clinicians and pathologists all over the world. The interest of most physicians was dormant untill the eighth decade, more than 40 years after Martin and Ellis described their 65 cases.

Trett and Randall (1979) compared fine needle aspiration biopsy cytology with surgical biopsy.

	<u>Surgical biopsy</u>	<u>Fine needle aspiration biopsy cytology</u>
Diagnosis	Histopathological	Cytopathological
Diagnostic facility	Narrow	Broad
Anaesthetic	Yes	No
Length of procedure	More than 5 minutes	Less than 5 minutes
Report available	1-2 days	1-2 hours
False positive	None	Rare
False negative	Few	Some
Cost	More	Less
Specimen obtained	In O.T.	In Outpatient, anywhere
Trauma	Yes	Little if any

During the past 10 years more interest has been shown not only in great Britain but in many parts of the world as well.

Overall, the aim of FNAB is to provide accurate diagnostic information, especially preoperatively. It is particularly applicable where the lesion in question is relatively inaccessible or unsafe for surgical biopsy. Naturally all superficial lesions are ideally suited to it, sensibly employed FNAB saves time, money and resources. This technique is being employed for almost all the regions of the body.

LYMPHADENOPATHY

Greig & Gray (1904) successfully sucked "juice" from cervical nodes to identify trypanosomes. Guthrie (1921) beginning with aspiration biopsy of lymph nodes in patients with sleeping sickness, tuberculosis, and syphilis had also isolated cells from lymphoma and carcinoma. Forkner (1927) examined lymphnodes with fine barb passed through 18 gauze needle and described benign & malignant cells. In Martin & Ellis's (1930) series there were 27 aspirates from superficial tumours and with Stewart's an additional 125 by 1933. Despite the promise of these early studies for more than two decades, there were only rare reports of ABC and Von Hamm (1921) accurately stated that this was a new frontier in cytology.

For the general surgeon and physician as well as specialist disciplines enlarged lymph nodes are a constant worry and FNAB is of value to reduce delay in identification of significance, allay anxiety and direct investigations (Engzell et al, 1971). With the aid of FNAB there is rarely a need to excise nodes involved by secondary carcinoma unless block dissection is appropriate.

The diagnosis of Hodgkin's disease by FNAB will dictate investigations, possibly avoid the risks from ill-judged surgical biopsy (Smithers, 1973) and one surgical procedure, the definitive and obligatory histological material being sought at the staging laprotomy. In non-Hodgkin's lymphoma FNAB is also valuable.

Lymphoma diagnosis is an every present difficulty despite attempts to arrive at more logical classifications (Lukes & Collins, 1973, Zajicek 1974, Lennert et al, 1975). For Hodgkin's disease FNAB is very precise, 44 out of 45 cases were identified. A later series of 98 patients collected from May, 1979 until February, 1981 attained a similar accuracy for Hodgkin's disease alone.

MAMMARY DISEASES

"One can never feel quite sure regarding the nature of palpable abnormalities in female breasts without a biopsy, but for practical reasons excisional biopsy can not be used unrestrictedly" wrote Soderstrom as a pernicious

to discussion on aspiration biopsy breast. These words succinctly set forth the importance of the technique introduced by Martin & Ellis (1930). Stewart (1933) who had examined 500 aspirated, advocated its use for the differentiation of fat necrosis, fibroadenoma and chronic breast abscess from carcinoma. During next 35 years only scattered reports appeared despite Stein's comment that 30% of breast surgery was delayed because of poor medical advice and that this delay could be eliminated by aspiration biopsy. Adair (1949) speaking before Royal College of Surgeons on behalf of aspiration biopsy, said " There is no place where more unnecessary surgery is done than in cystic disease ".

Cornillet and Verhaeghe (1959), described the success of the technique in 500 cases, pointing out its simplicity and lack of complications, and Klimanova (1961) stressed its reliability. From the Karolinska Institute Stockholm came largest published series (Franzen & Zajicek, 1968) of 3479 consecutive biopsies in an authoritative and well illustrated paper. Webb (1975) recorded 520 FNAB's in 610 patients of which 132 were proven breast cancers. The accuracy rate of FNAB was 96.2%. In a parallel group of 109 proven non-malignant cases the figure was similar at 97.4%. Other published series have indicated comparable accuracy at around 90% (Adair 1949, Zajdela, 1967, Cornillet et al., 1971 and Rajic 1971). A recent British publication (Duguid et al.

1979) strongly supported FNAB and returned an 83% (50/60) undoubted positive reading for breast cancer. The failed aspiration rate is low around 1%. FNAB complements clinical and radiological diagnosis, thus triple assessment has been reported to produce a 99% accuracy for benign and malignant disease (Zajdela et al., 1975; Boquoi & Kreutzner 1981, Halberger et al. 1981). Great care must be taken to avoid false positive reports. Cellular fibroadenoma and duct ectasia bear a risk in this respect (Lever 1980).

SALIVARY SWELLINGS

Any enlargement or palpable lesion arising within the region of a salivary gland is termed a salivary swelling. Clinical examination of these lesions is far less accurate than for breast lumps (Petey & Mand, 1952, Shaw & Friedmann, 1959, Thackray & Lucas, 1974). Stewart (1933) described small spindle cells, epithelial cells and cartilage in aspirates from 66 mixed tumours of salivary glands. This study and the 65 cases reported by Von Hamm (1962) have been the only ones of note from the United States. Foote & Frazell's (1954) classification of salivary gland tumours, however, stimulated a remarkable interest in Scandinavia, not only in pathology of these neoplasms but also in their classification by means of aspiration biopsy. Soderstrom (1959) depicted the normal acinar cells of parotid gland, and by 1966 he had studied 150 cases. Radiumhennet became a leader in the collection of these aspirates, with 632 in

1963 and 1000 by 1967, all correlating with the corresponding tumours.

The place of biopsy in salivary gland lesions is a vexed question (Maynard, 1967; Thackray & Lucas, 1974) but with the help of FNAB, salivary surgery should be precise. Difficult per-operative decisions over incision biopsy and frozen section diagnosis are avoidable (Petey 1965, Webb 1973).

Over past 5 years no false positive error has been made and current accuracy for pleomorphic adenoma approaches 100%. Excellent published illustrations of cytology are available in Cardozo's atlas (Cardozo, 1979) and in a succession of reports from the Stockholm Radium hemmet cytologists who, for over 25 years developed & propagated this aspect of cytodagnosis (Maves et al., 1964; Eneroth & Zajicek, 1969; Zajicek, 1974).

ABDOMEN

The indication of FNAB is infrequent but important, and occasions do arise in general surgical practice when the information obtained by cytology is invaluable (Wasastjerna, 1979).

THYROID

Stewart (1933) discussed the merit of aspiration biopsy from thyroid. Judging from 45 cases, he felt that the process was useful for diagnosis of anaplastic carcinoma but

ambiguous for the differentiation of papillary and follicular carcinoma from colloid nodule. In fact, after accumulation of 90 cases, the technique was discontinued at Memorial hospital. Elsewhere, Lipton & Abel (1944) measured aspirated cells to evaluate hyperthyroidism, and Tempka and Associate (1948) studied aspirates from colloid goiters. In the next decade, interest in United States was directed toward thick-core biopsy. Simultaneously, the Scandinavians turned their attention to fine needle biopsy. Led by Soderstrom (1952), who described ABC of 100 cases of goitres, others have studied thyrotoxicosis, adolescent goiter, thyroiditis, and a few malignancies.

Although aspiration biopsy from thyroid gland has not been as vigorously pursued as that from other sites, interest waxes because of dilemma solitary cold nodule. These nodules, which do not concentrate isotopes on radio-nuclide scans, pose problems in management for the clinician. Of more than 1000 patients hospitalized for a neck mass, a thyroid nodule was responsible for almost half and, in other series, for more than one third although only 6% were malignant.

Regarding the management of patients with solitary thyroid nodule, Einhorn and Franzen wrote, "There is no laboratory procedure which alone can establish the diagnosis". Evaluation includes myriad examination scintigraphy, circulating antibody titers, ultrasonography

Selenome Hiconine Scan, Temporization is imposed by observation and suppressive hormonal therapy and results may be misleading : a cyst may remain unaltered and a malignancy appear to shrink. This expensive and time consuming battery of tests evokes a few outliers, and where aspiration biopsy is practiced, surgery is halved. Crile & associated stated that by routine use of needle biopsy". In 82% of the patients with palpable lesions. It was possible to rule out the presence of cancer in suspicious area and to use medical treatment instead of thyroidectomy.

LIVER

Large needle (Menghini) biopsy of the liver to obtain a tissue 'Core' is widely practiced (Sharlock, 1981; Smith, 1969). It is not without complications from haemorrhage and biliary leakage and sometimes FNAB is more convenient, equally productive and less dangerous, under local anaesthesia and sedation FNAB is suitable, employing either a 21 gauge or 10 to 15 mm 23 gauge needle. The ideal indication is where the liver is palpably enlarged and differentiation between secondary carcinoma, cirrhosis, primary hepatoma and lymphoma has to be made. It is essential that clotting factors are checked before hand. FNAB of deep and inaccessible lesions may also be profitable during laparotomy or laproscopy. The results from a small collected series is shown in Table.

LIVER BIOPSY

Total patients	44
Total cytological procedures	47
FNAB	33
Imprint smears	14

The yield of cells was satisfactory in all cases and smears were entirely reliable for identifying secondary carcinoma. The examples of primary carcinoma were suspected cytologically (Zach, 1972) and one further example will remain unproven as autopsy was refused. The hamartoma was unusual from a cytological view-point but other congenital abnormalities were present and a benign nature must be assumed from an 11 year subsequent survival. There was one example of biliary peritonitis following FNAB in a patient with obstructive jaundice from an ampullary carcinoma : Surgical relief was successful.

FNAB liver, distribution of cases and
confirmation

		Histological confirmation	Clinical
Total patient	33		
Secondary carcinoma	9	16	³ (all died)
Cirrhosis	3	3	
Primary cholangio- carcinoma	2	2	
Non-Hodgkin's lymphoma	3	3	
Hamartoma	1	-	¹ (allive & well)
Lipoidosis (Gaucher's disease)	1	1	

		Histological confirmation	Clinical
Normal liver	3	3	

SPLEEN

Splenic aspiration using a long 21 gauge needle through 9th or 10th intercostal space in mid-axillary line is suitable as a indoor or outpatient procedure, under local anaesthesia and sedation. The monograph by Meeschlin (1951) on splenic puncture is valuable for both technical and cytological details. Soderstrom (1966) also provides some illustrations. Ten examples in this series were of lymphoma (Hodgkin's disease 2 patients) and all were eventually confirmed by histology. In two other instances the splenic puncture proved the diagnosis where other investigations had failed. Soderstrom (1979) has recently updated his experience.

ABDOMINAL AND RETROPERITONEAL MASS

There is a small, clinically select, group of patient where clinical problems led to a request for FNAB. The main reasons were failure of sophisticated investigations (Scanning, arteriography) to provide an answer and where major surgery had erroneously been performed (e.g. pneumonectomy, craniotomy). It has not constituted a regular service but has invariably succeeded in solving the problem. A preliminary series of instruction or learning slides had been collected over many years including smears from

urothelial cancers, adrenal neuroblastoma, pheochromocytoma, adrenal cortical carcinoma, benign fibrous and malignant retroperitoneal lesions and female genital neoplasms. The small series is shown in Table.

Abdominal and retroperitoneal masses FNAB

Total patients	21	
Renal	6	Carcinoma 6
	1	Pyelonephrosis (Per-operative FNAB)
Teratoma	4	Adrenal 1 Sacrococcygeal 3 (children)
Retroperitoneal mass	2	Giant cell sarcoma LV4 and 5 Secondary testicular teratoma
Abdominal mass	2	Neuroblastoma Fibrosarcoma
Umbilical nodules	4	1 Lymphoma (child) 3 Secondary carcinoma
Pelvic mass	2	Chordoma Fibrosarcoma

The FNAB result often suggested that a major surgical intervention could be avoided; in others surgery was clearly indicated. Including findings from autopsy, 18 of the 20 cases were confirmed by histology. It has not been local practice to confirm and grade renal cancer by F N A B; a procedure customary in Stockholm (Van

Schreeb et al, 1967). However per-operative FNAB and immediate theatre cytology with the aid of Diff-Quik stain is occasionally worthwhile. There is an increased interest in renal puncture in Great Britain (Highman & Sherwood, 1978). Transmural FNAB of abdominal masses has so far only been performed where the mass felt closely accessible and the area was dull to percussion.

SOFT TISSUE LESIONS

The utility of FNAB in accessible soft tissue lesions has been surprisingly good. In addition, scrape smears are always made from resected specimens as cytology complements the histopathology. The histopathology of soft tissue lesions has always been problematical especially for sarcomata (Stout and Lattes, 1967). Indeed the terminology and interest is changing with more emphasis within the past 10 years towards malignant fibrous histiocytoma. Mackenzie (1975) has contributed much to tissue diagnosis, in particular regarding role of the histiocyte. With any soft tissue tumour, the clinical features, operation findings, macroscopic appearance & radiological characteristics must blend with the histology to finalise a diagnosis.

The aim of FNAB has been to confirm the nature of soft tissue lesion, without danger and within 24 hours or less. The nature of lesion in a particular site should dictate the suitability for an extent of surgery (local exci-

sion or amputation). A cytological diagnosis will also provide a basis for informed discussion and prognosis. It may also modify the timing of surgery in relation to other treatment modalities. The technique for FNAB is standard but occasionally longer needles are more convenient. The sclerotic & fibrotic tumours will yield scanty smears.

PANCREAS

Carcinoma of the pancreas is increasing in frequency and constitutes a major challenge in both diagnosis and therapy. The present position and the attempts in America to improve detection have been reported by Meesa (1979). Ultrasonography and endoscopic retrograde cholangio-pancreatography with exfoliative cytology are the most productive investigations in a disease which is all too frequently irresectable at laparotomy.

The status of pancreatic biopsy remains rather uncertain for so important a procedure and a review by Reuben & Cotton (1978) demonstrated that for British Surgeons, principles, practice and technique were somewhat haphazard. The selection of FNAB as the procedure of choice seems obvious as it is eminently suitable for deep and small lesions; a fine (23 gauge) needle can pass without gross trauma through other organs en route for the pancreas and not carry a prohibitive risk of malignant

cell seeding. Forsgren & Orell (1973) reported FNAB of pancreas in 40 patients and at that time found two previous references (Christofferson & Poll, 1970; Sternby & Akerman, 1971). Since then, further experience has been gained from both pre-operative FNAB (Shorey, 1975; Evander et al, 1978) and pre-operative puncture (Arnesjö et al, 1972; Goldstein et al, 1977; McLoughlin et al, 1978; Holm et al, 1979; Sternby, 1979).

Pre-operative guided aspiration is capable of producing an 81% positive rate for carcinoma; puncture at laparotomy is, as expected, more precise.

PROSTATE

Franzen et al (1960) published their preliminary findings on transrectal FNAB using a new and simple instrument. This technique is a brilliant example of how FNAB can obtain diagnostic material from a deeply placed relatively inaccessible organ. It has revolutionised prostatic diagnosis and is far safer and more convenient than large needle techniques (Ekman et al 1967). It is sporadically practised in Great Britain (Williams et al, 1967).

Detailed descriptions of the technique and cytological appearances are provided by Soderstrom (1966), Cardozo (1979) and Paul & Schmiedt (1973). Esposti (1966, 1971) has reported on a large group of patients including detail on the grading of prostatic cancer and serial puncture to review the response to hormonal therapy. The false negative

rate for proven prestatic cancer was 10%. There is no serious controversy over the potential value of FNAB for the diagnosis of prestatic cancer but some uncertainty regarding its safety and value in prostatitis. Staehler et al (1975) have reported favourably on it. The author performed pretatic FNAB whenever the indication is present. Some 45 patients have been examined mostly for prestatic cancer. The technique is uniformly successful in producing diagnostic smears and the results show an accuracy rate of over 90%. There have been no complications from the technique.

TESTIS

Testicular cytodagnosis is, in general, a limited field but Cardozo (1979) includes a well illustrated chapter devoted to it. FNAB of the testis is favourably reported for the investigation of infertility and confirmation or otherwise of possible deposits from lymphoblastic leukaemia in childhood (Zajicek, 1979). By contrast, the diagnosis of primary testicular tumours by large needle puncture of testicular neoplasms may lead to scrotal implantation. Despite this, in Scandinavia the use of FNAB in the diagnosis of testicular swellings with a very fine needle (0.6 mm diameter) is accepted. Zajicek (1979) reported on 100 consecutive cases of testicular neoplasm diagnosed by FNAB and followed for between 2 and 18 years. There was one example of local tumour recurrence in the scrotum and one

other where regional inguinal nodes later became involved by metastases. Incorporating evidence on 314 malignant testicular tumours and inguinal metastases reported from Norway by Miller & Seljelie (1972) Zajicek argues that FNAB is free from risk.

CERVICAL CYSTS AND MISCELLANEOUS LESIONS

Thyroglossal, branchial and inclusion dermoid cysts lie within a differential diagnosis of cervical swellings, the majority of which will be lymph nodes (Engzell & Zajicek, 1974). FNAB can be most useful in the diagnosis of these swellings and a simple puncture in the out patient clinic will often transform a scene of diagnostic mystery. Thyroglossal cysts in the classical position are clear enough but may be confused with a low submental lymph node. If the cyst lies more laterally then puncture will release colloid fluid with natural thyroid cells. This presentation must however be carefully distinguished from cystic metastatic nodes regional to a papillary carcinoma of thyroid. Branchial cysts are frequently confused with enlarged lymph nodes (Zajicek, 1974) and FNAB will obviate such an error. The smears show cholesterol crystals, inflammatory cells and squames in all stages of degeneration. So far, the author has not confused them with nodes invaded by well differentiated squamous carcinoma as cautioned by Engzell & Zajicek (1970). Two examples of carotid body tumour have been correctly reported by FNAB. If such a lesion is suspected on clinical grounds then a fine 23 gauge needle is recommended for puncture (Cardozo, 1979).



MATERIAL & METHODS

MATERIAL AND METHODS

This study was conducted on the patients attending the M.L.B. Medical College Hospital, Jhansi from June 1987 to July, 1988. A detailed history and examination was done as follows.

- History of patient
- Name - Age - Sex
- Address
- History of present illness
- Past history
- Examination
 - General
 - Systemic
 - Local

MATERIALS

1. Spirit swab to clean the skin
2. Fine needle 22-23 gauge
3. Syringe 20 ml
4. Slides
5. Fixative 90% Ether and 10% Alcohol
6. Collection of specimens from patients & its reports.

METHOD

The skin was cleansed with spirit swab. Xylocaine was injected at the periphery of the mass to avoid obscuring its contour. A sterile needle was attached to the syringe, dry and emptied and was guided to abnormal area with vacuum created by retraction of the plunger, the needle was moved back and forth in stabbing motions. This manipulation was especially important for adequate sampling of fibrotic tissue. Negative pressure (vacuum) was maintained until the needle was withdrawn to the subcutis. Two or Three samples were optimum for solid lesions.

The specimen almost entirely contained within the needle lumen, was forcibly injected on to the slides. Detaching the needle to introduce air into the syringe and then re-attaching it to enhance the cellular expulsion. The smear was prepared from the material so obtained and fixed in proper fixative and then was subjected to papanicolaou staining method and cytopathological examination.

After the procedure, patient was observed for any complication. The cytological diagnosis thus obtained was recorded. Subsequently, if required and possible patients were subjected to surgery to take

incisional or excisional biopsy. Paraffin section was prepared for histopathological diagnosis.

There-after the cytological and histopathological findings were compared. All the clinical and pathological data about the cases was recorded the form of cyclostyled proforma.

F.N.A.B. WORKING PROFORMA

NRD NO.

Name

Age

Sex

Address

Wd/Bed

Complaints : 1.

2.

3.

4.

History (Relevant)

Clinical examination of lump

Clinical diagnosis

F N A B taken from

Date

Preservative used

Cytological findings and diagnosis

Operative findings

Histopathological findings and diagnosis

Conclusion and any specific notes :



OBSERVATIONS

OBSERVATIONS

Present work was conducted in on institution M.L.B. Medical College, Hospital, Jhansi from June 57 to July, 58. In this study there were 111 cases having lumps in various regions of body. These cases fell in different age groups as mentioned below in table No. 1.

TABLE No. 1

Age wise distribution of cases

Age groups (years)	No. of cases	Percentage
0 - 10	5	4.50%
11 - 20	13	11.72%
21 - 30	23	20.72%
31 - 40	19	17.11%
41 - 50	20	18.03%
51 - 60	27	18.92%
61 - 70	7	6.3%
71 - 80	2	1.8%
81 - 90	0	0
91 - 100	1	0.9%
Total	100	100.00

Out of these 111 cases, 45 were males (40.54%) and 66 were females (59.46%) as mentioned below in table II.

TABLE No. XI
Sex distribution of cases

Sex	No. of cases	Percentage
Male	45	40.54%
Female	66	59.46%
Total	111	100.00%

Out of these 111 cases, 31 were of breast lump (29.93%), 25 were of lump in abdomen (22.53%), 26 were of lymphadenopathy (23.43%). 8 were of thyroid swellings (7.21%), 6 were of salivary glands enlargement (5.40%), 8 were of soft tissue swellings (7.20%), 3 were of prostatic enlargement (2.70%), Four were of miscellaneous. The findings are depicted in table III.

TABLE No. XII
Distribution of organ/tissue examined in the study

Organ/Tissue	No. of cases	Percentage
Breast	31	27.93%
Lump abdomen	25	22.53%
Salivary glands	6	5.40%
Lymphnodes	26	23.43%
Thyroid	8	7.21%
Soft tissue	8	7.20%
Prostate	3	2.70%
Miscellaneous	4	3.60
Total	111	100.00%

Out of our 111 cases, we met failed aspiration in only 9 cases (8%), examined by FNAC as in table IV.

TABLE NO. IV

Positivity of aspiration

Result	No. of cases	Percentage
Positive	102	92.00%
Negative	9	8.00%
Total	111	100.00%

In our study, only 100 cases could be examined for both the procedures. FNAC diagnosis was accurate in as many as 96 cases (96%) as shown in table V.

TABLE NO. V

Validity of FNAC in studied cases

Agreement of FNAC results with those of histopathological biopsy	No. of cases	Percentage
Yes	96	96%
No	4	4%
Total	100	100%

No. 1 Breast :

We have aspirated 51 cases of Breast lump. Out of which 3 cases of carcinoma male breast and 28 cases of female breast lump. Aspiration was positive in all

three male breast (100%). While out of 28 cases of female breast lump aspiration was positive in 25 cases (89.2%). In all positive aspirations 18(64.28%) were malignant and 10 were found benign lesions (35.72%). In all positive cases cytological diagnosis was identical to histological diagnosis.

Table VI
FNAC of breast lumps.

Sl.No.	Sex	FNAC	No.of cases	Findings		
				Benign	Malignant	Other
1.	Male	-Positive	3(100%)	-	3	-
		-Negative	-	-	-	-
2.	Female	-Positive	25(89.7%)	10	15	-
		-Negative	3(9.7%)	-	-	-
Total			31	10	18	

2. Abdominal lumps

In our present study we have examined 25 abdominal lumps including renal lumps and retro-peritoneal masses. Out of 25 cases 8 were males and 17 were females. Aspiration was positive in all cases and cytological diagnosis was similar to histopathological diagnosis. In one case FNAC was inconclusive because of poor preservation etc. Out of 20 abdominal lumps cytologically 19 were malignant, both kidney lumps were malignant and all three retroperitoneal masses were malignant.

TABLE VII

FNAC findings of various abdominal lumps.

Abdominal lumps	No. of cases Positive/Negative	Findings		
		Benign	Malignant	Other
Abdominal lumps	20(100%)	1	19	-
Kidney lumps	2(100%)	-	2	-
Retroperitoneal masses	3(100%)	-	3	-
Total	25(100%)	1	24	

3. Lymphnode Enlargement

We have examined 26 patients of lymphadenopathy. We were able to aspirate material in all 26 cases. In all positive cases 9 were benign and 17 were malignant. Findings of FNAC tally with histopathology report. In one case of cervical lymphadenopathy we find microtilaria in smear. Results are as depicted as below in table VIII.

TABLE VIII

FNAC findings of lymph nodes

FNAC	No. of cases	Findings		
		Benign	Malignant	Other
Positive	26(100%)	9(34.62%)	17(65.38%)	-
Negative	-	-	-	-
Total	26	9	17	

4. Thyroid Swelling

In our study of 8 cases of thyroid swelling, 5 cases were positive for aspiration material Out of which 3 were malignant & two benign all 5 positive smear tally with histopathological report.

TABLE IX

FNAC findings of thyroid swelling

FNAC	No. of cases	Findings		
		Benign	Malignant	Other
Positive	5(62.5%)	2	3	-
Negative	3(37.5%)	-	-	-
Total	8(100%)	2	3	

5. Salivary glands

In our study we have examined two cases of parotid swellings and four cases of submandivular swelling. Aspiration was positive in both cases of parotid 100%. One case was diagnosed as pleomorphic adenoma and another was epidermoid carcinoma. Both report were identical with histopathological report.

TABLE X

FNAC findings of parotid swellings

FNAC	No. of cases	Findings		
		Benign	Malignant	Other
Positive	2 (100%)	1	1	-
Negative	-	-	-	-
Total	2	1	1	

Out of four cases of submandibular swelling aspirations was positive in three cases. In one case cytological diagnosis was epidermoid carcinoma. While the histopathological diagnosis was pleomorphic adenoma.

TABLE XI

FNAC findings of submandibular swellings

FNAC	No. of cases	Findings		
		Benign	Malignant	Other
Positive	3 (75%)	3	1	-
Negative	1 (25%)	-	-	-
Total	4	3	1	

6. Prostate

In 3 cases of prostatic enlargement, aspiration was positive in two cases and negative in one case. In both positive cases FNAC diagnosis were carcinoma prostate which was confirmed by histopathological diagnosis.

TABLE XII

FNAC findings of prostatic enlargement

FNAC	No. of cases	Findings		
		Benign	Malignant	Other
Positive	2 (66.6%)	-	2	-
Negative	1 (33.3%)	-	-	-
Total	3	-	2	-

7. Soft tissue tumours

We have examined 8 cases of soft tissue tumours aspiration was positive in 7 cases. In one case only RBCs and necrotic material was present. Out of 8 positive cases 3 were benign and 4 were malignant.

TABLE XIII

FNAC findings of soft tissue tumours

FNAC	No. of cases	Findings		
		Benign	Malignant	Other
Positive	7 (87.5%)	3	4	-
Negative	1 (12.5%)	-	-	-
Total	8	3	4	

8. Miscellaneous

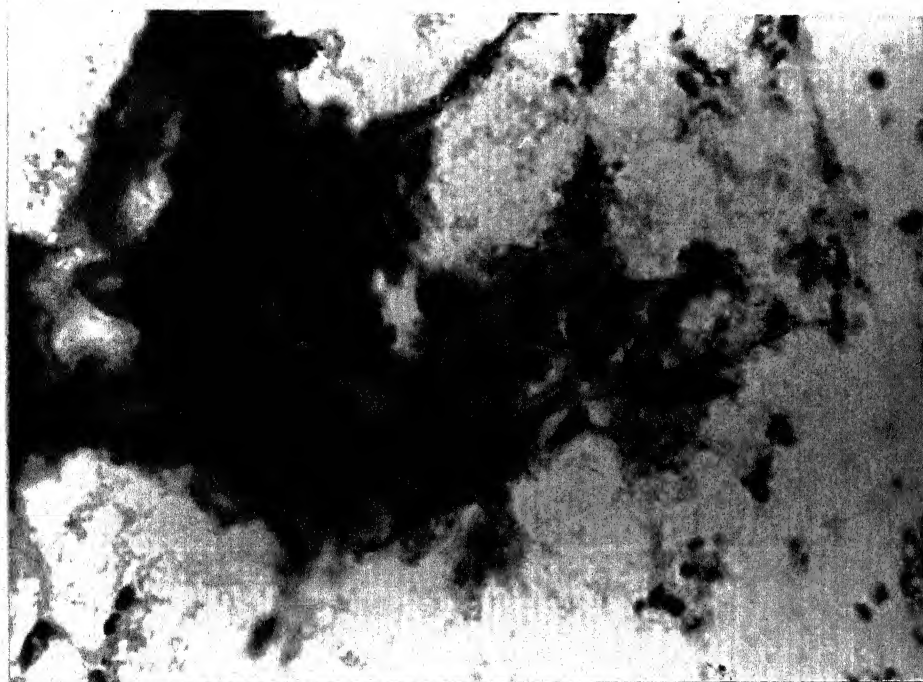
In this group we have examined four cases. Cytologically one case of inguinal swelling diagnosed as ectopic testis. Another case of Angular swelling diagnosed as pleomorphic adenoma of Ectopic salivary glands. Other two cases were diagnosed as neurofibroma and capillary haemangioma respectively. The cytological findings were confirmed by histopathology in all four cases.

TABLE XIV**FNAC findings of miscellaneous swellings**

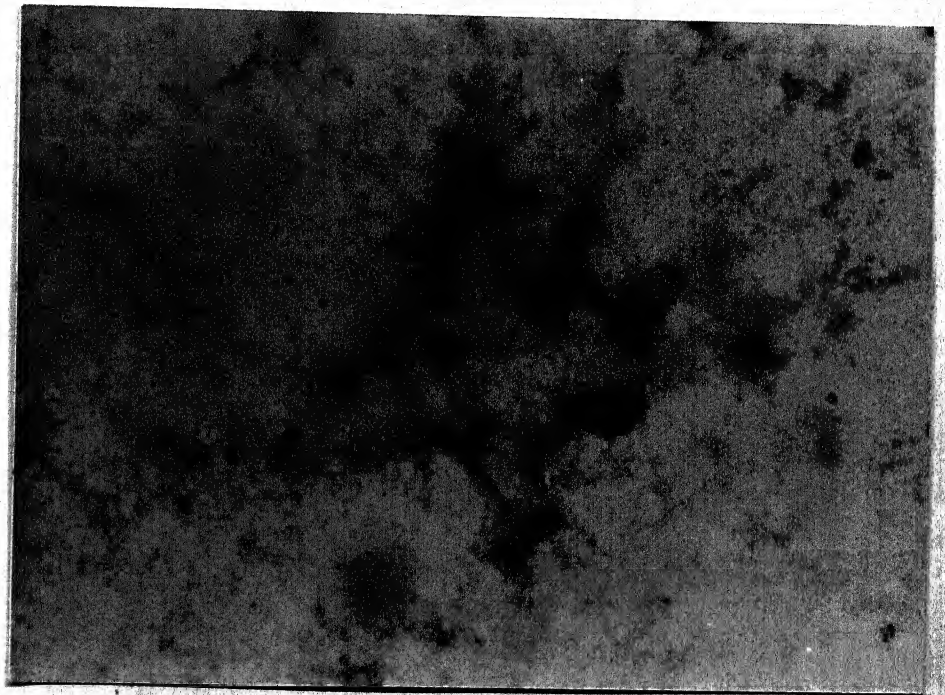
FNAC	No. of cases	Findings		
		Benign	Malignant	Other
Positive	4 (100%)	4	-	-
Negative	0	-	-	-
Total	4	4		

Complications

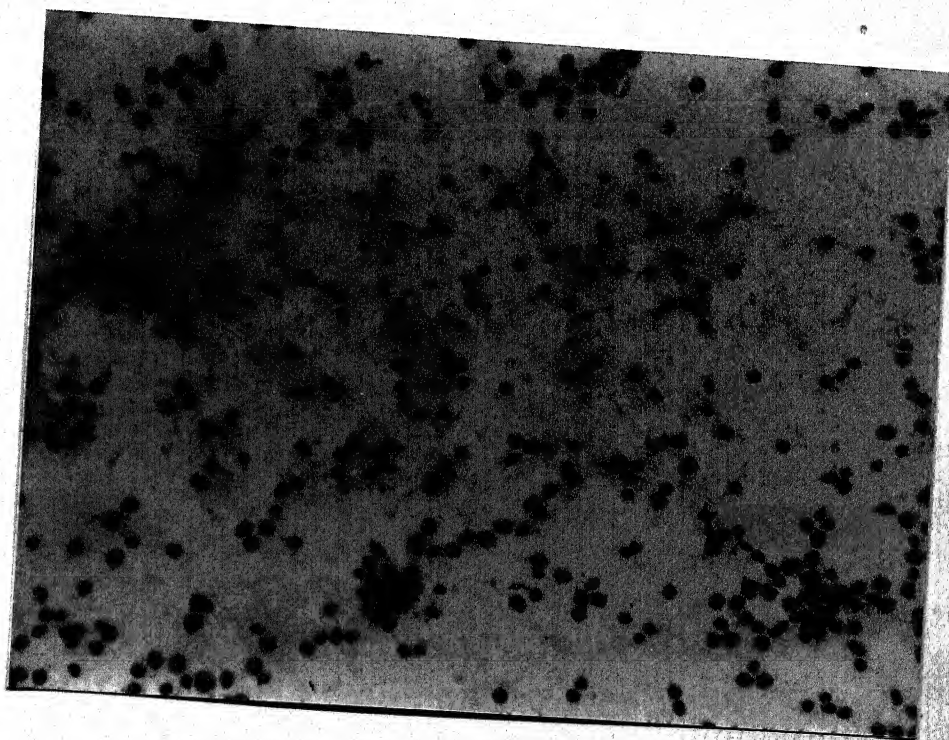
In our study, there were no complication like haemorrhage, needle tract spread or sepsis. So incidence of complications was nil in our study.



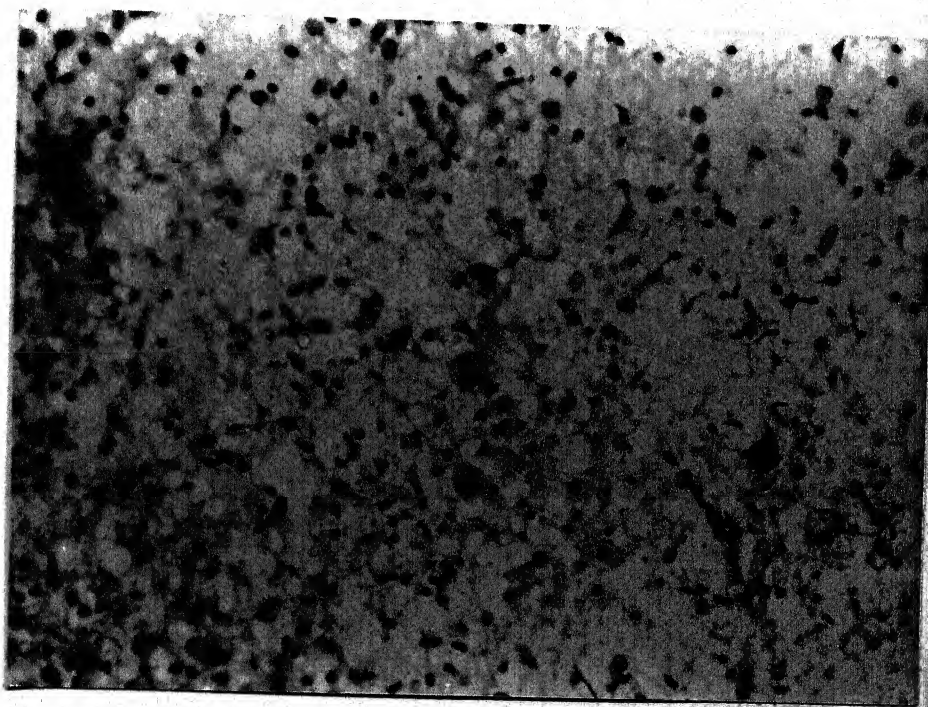
FNAC smear showing epidermoid carcinoma
(Papanicolaou preparation)



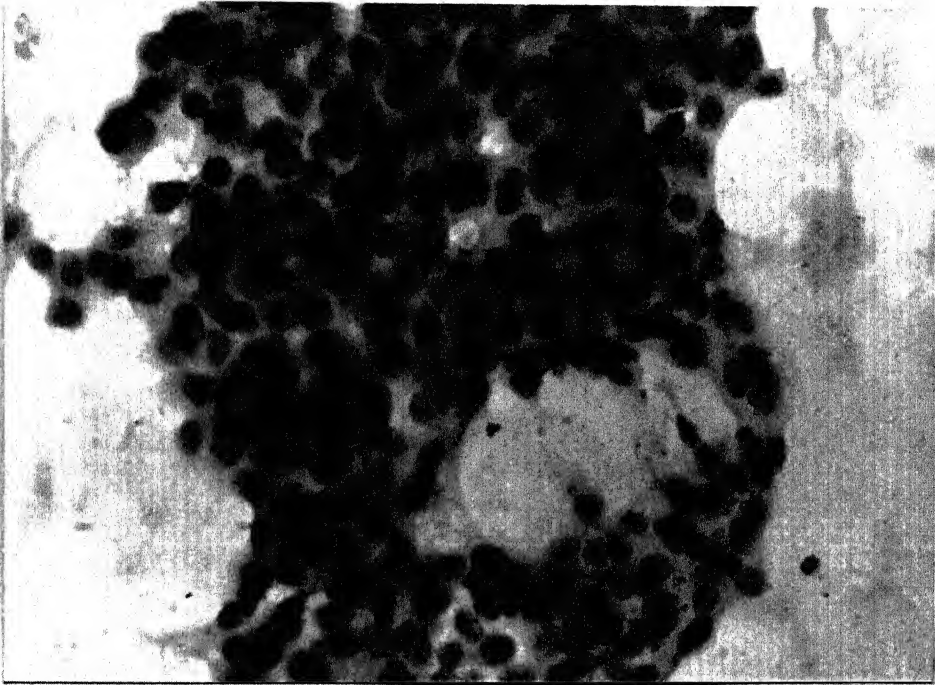
FNAC Kidney Showing Malignant cells Hypernephroma
(Papanicolaou preparation)



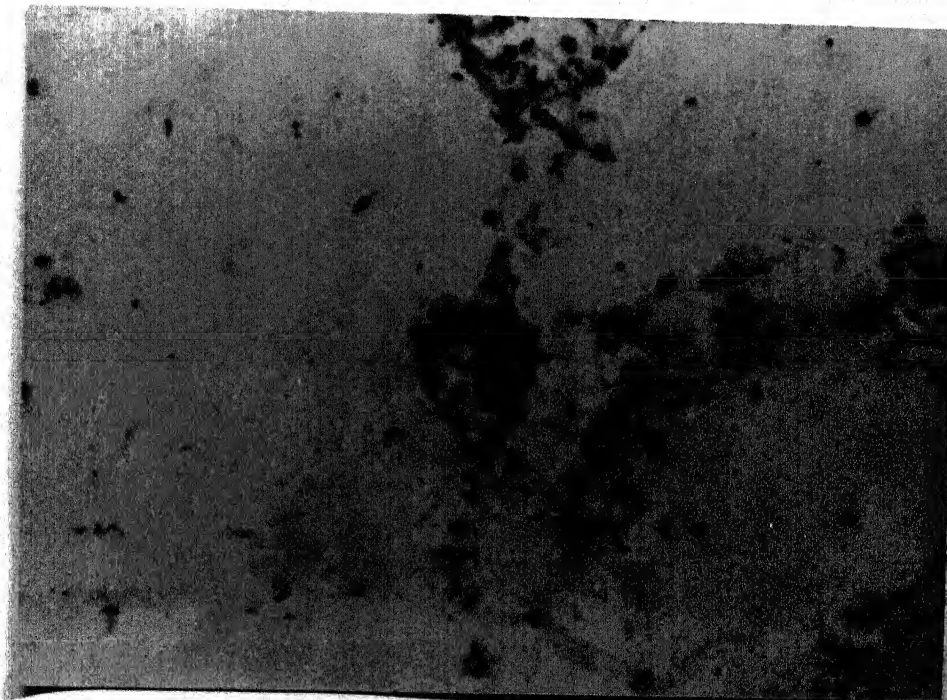
FNAC Lymphnode (Abdominal) Showing Non Hodgkin's Lymphoma
(Papanicolaou Smear)



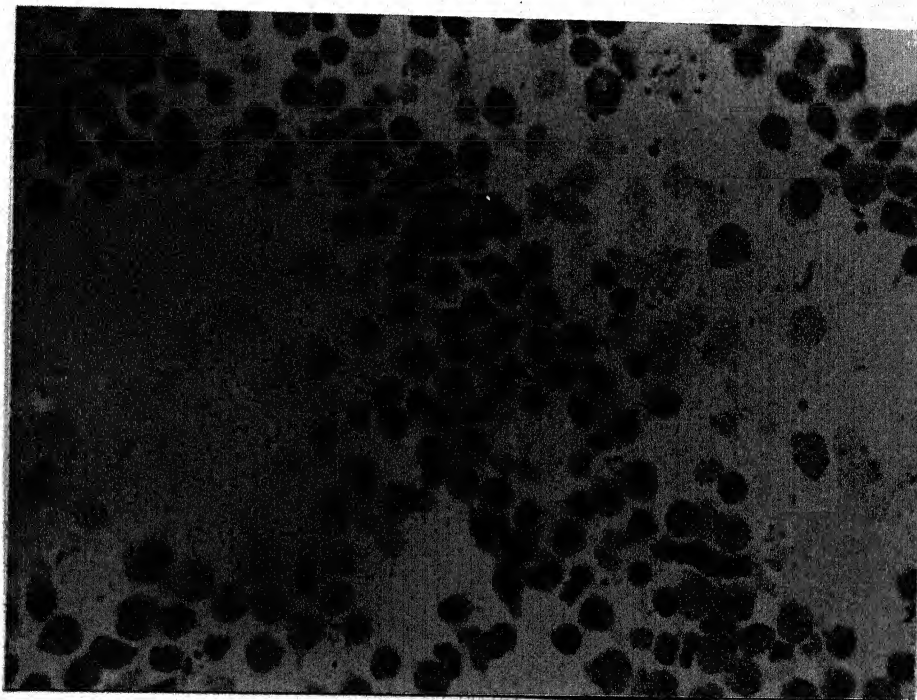
FNAC Lymphnode Showing Hodgkin's Lymphoma
(Papanicolaou Smear)



FNAC Breast Showing Adenocarcinoma
(Papanicolaou Smear)



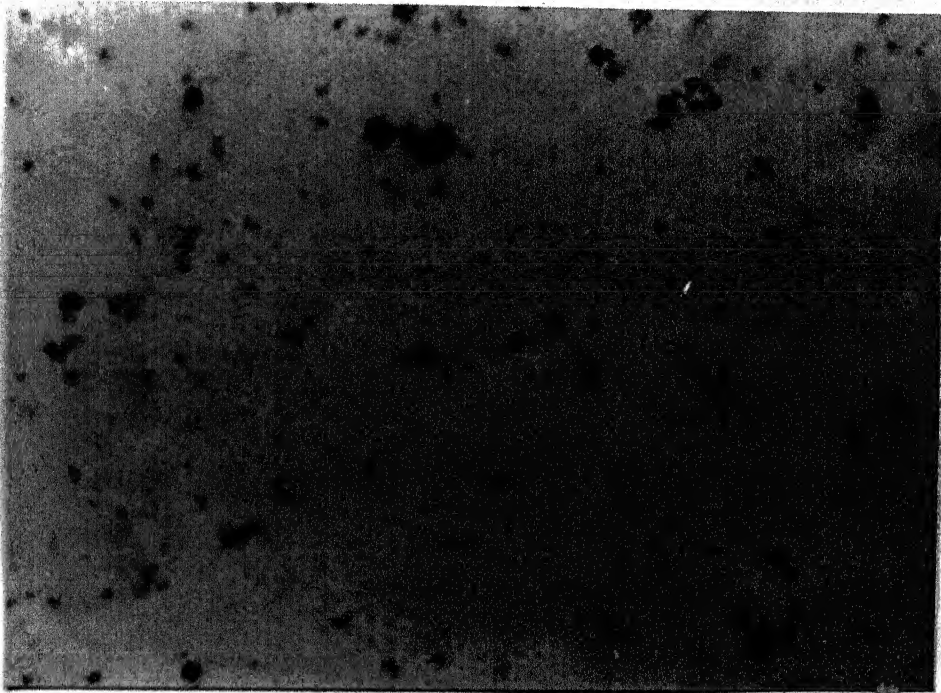
FNAC Breast Showing Plasma Cell Mastitis
(Papanicolaou Smear)



FNAC Parotid Showing Malignant Cells
(Papanicolaou Smear)



FNAC Epigastric lump Showing Adenocarcinoma
(Papanicolaou Smear)



FNAC Soft Tissue Tumour Showing Malignant Cells
(Papanicolaou Smear)



DISCUSSION

DISCUSSION

Published work on FNAC reports a reliability between 80 to 97 percent (Kline TS et al 1981). The accuracy of FNAC in our series (96%) is very well with in this range. However we had to repeat the procedure (5-10%) in 25 percent cases which is sufficiently higher than what has been repeated by others (Ferguson et al 1950). There are many published reports (Furnival 1975) where the proportion of unsatisfactory smear is high between 20-30 percent. We could not obtain adequate aspiration smears only in 9 percent cases. Safety of the procedure is very well proven at present (Martin and Stewart 1956), we also could not observe any complication in our series in any case.

Breast

FNAB allows fuller investigation and wiser pre-operative discussion than was possible when excisional biopsy and frozen section confirmed the clinical diagnosis. FNAB possesses the following specific advantages in the management of breast lumpiness or a discrete palpable lesion (Webb, 1981).

1. Confirmation of the presence of cancer in a clinically likely case.
2. Combined with clinical examination, mammography, where and when appropriate and more recently Doppler Ultrasound

FNAB indicates management of mammary dysplasia with added confidence and avoidance of inappropriate surgical intervention (Cornillot et al, 1971).

3. FNAB may be treatment of choice for breast cysts by emptying (Patey & Hurick, 1953).

4. In presence of four quadrant and/or inflammatory lesions where both excisional/incisional biopsy are initially unwise, FNAB is ideally suited and particularly accurate.

Webb (1975) reported accuracy rate of 96.9 percent in breast cancer, however in non-malignant group it was 97.4% . Other published series have indicated comparable accuracy at around 90% (Zaidela 1967; Rajic, 1971).

In our study, 31 cases of breast lump were examined by FNAC smear. It was positive in 28 cases (90.32%). Diagnostic accuracy in breast lumps in our study was 100%. So, FNAC in cases of breast is very useful.

Abdominal lumps

We studied 25 cases of intraperitoneal and retroperitoneal lumps, out of which 14 (52.35%) concomitant biopsy was performed. We observed 100% accuracy of ABC in diagnosing these lumps. According to Vasartijerna (1979), the abdominal indication for FNAB is infrequent, but Well (1982) reported that in 18 cases out of 20 abdominal lumps cases in which ABC was performed histology was confirmed by autopsy. Our result emphasises that cumbersome diagnostic procedures and diagnostic laprotomies might be avoided by

Kidney lumps

In Stockholm, (Von Schreeb et al, 1987) it is local practice to confirm and grade renal cancer by FNAB.

In our study we have examined two cases of renal lumps. Aspiration was positive in both cases (100%). Diagnostic accuracy was also 100%. We conclude that FNAC is very useful in the diagnosis of renal lumps.

Salivary glands

In our series, ABC emerged an excellent means of diagnosing the swelling of salivary glands. Clinical examination of parotid lesions is far less accurate than for breast lumps. (Patey and Hand 1952, Shaw & Friedman, 1959, Theakray & Lucas 1974).

In our study, two cases of Parotid swelling were examined by FNAC, which were compared by histopathological examination. FNAC results were accurate in both cases 100%. Similar results were found in cases of submandibular gland swellings. The reported cytological accuracy of salivary gland lesions for neoplasms is about 98% (Engell & Espati 1971).

Lymphnodes

Engell et al (1971) found 89% cytological accuracy in cases of non malignant lymph nodes. However, the reported accuracy of diagnosing malignancy and lymphoma is 96% and 94% respectively (Ferguson 1930, Webb, 1978). According to

Andrew flient et al (1988), cytologic features of Hodgkin's disease are not only characteristic, but are also diagnostic.

In our series of 26 patients, we could observe 100% accuracy in diagnosing malignancy and lymphoma.

In one case of cervical lymphadenopathy we found microfilaria in the smear.

Thyroid swelling

A John Webb (1982) who examined 330 cases of thyroid by FNAB with one failed aspiration, it was accurate in as much as 191 cases who could be confirmed by histology. Overall diagnostic accuracy of FNAB in Goitre cases by different authors has been shown below.

Overall diagnostic accuracy of FNAB by different workers compared with the present study.

Author and year	No. of cases	Diagnostic accuracy	False positive	False Negative
*Frazell and Foote (1958)	98	70%	-	26%
Rinhorn and Franzen (1962)	216	90%	-	2%
Nilsson and Persson (1964)	48	100%	-	-
**Lewhagen and Sprenger (1974)	60	-	-	-
Frable (1976)	20	95%	-	5%
Lewhagen et al (1979)	412	97%	-	2.2%
Present study (1986)	4	100%	-	-

* In 3%, the results of aspiration biopsy were uncertain.

** The authors made a correlative study without actually mentioning the accuracy rate of diagnosis or other pitfalls in diagnosis.

B.Ghoshal et al, (1984) reports an accuracy of about 93%. In the remaining 7% of cases it was failed aspiration.

In our study, we could examine only 8 cases of thyroid swelling. Aspiration was positive in 5 cases (62.5%). In all these cases, the histopathological diagnosis tallied with FNAB report giving an overall accuracy of 100%.

Soft tissue tumours

Soft tissue cytology is an advancing field and its benefits for surgical practice, histological exactitude and the advance of errors in management deserve greater recognition.

In our study of 8 cases of soft tissue tumours, we made similar diagnosis by ABC and excisional biopsy. In all the seven cases, where adequate tissue aspirate for cytology was obtained. Available literature on this aspect reports over all diagnostic accuracy being 12%, while that of neoplasm is being 85%.

Prostate

In our study, we could examine only 3 cases of prostatic enlargement. The positivity rate of FNAC was

66.6% and accuracy rate was 100%. The available literature shows 90% accuracy rate in cases of Prostate (Staether et al 1975).

Miscellaneous

In our study of 4 cases of various lumps, we found positive aspiration in all cases (100%), and the accuracy rate was also (100%). The histopathological findings were same in all cases.



CONCLUSION



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S U M M A R Y

Fine needle aspiration biopsy (FNAB) or aspiration biopsy cytology (ABC) as it is known today, is study of the cells, obtained by fine needle under vacuum. Any area of the body is suitable target without any danger.

Fine needle aspiration biopsy has emerged slowly since Martin & Ellis (1930) conducted their study & has been refined over 25 years by various authors all over the world.

Guthrie (1921) first used lymph node aspiration on a systematic basis & the method was pursued both in America (Martin & Ellis, 1934) and Europe (Pitteluga, 1922; Well et al, 1934). Since then it has gained major acceptance in Scandinavia and isolated centres in North & South America. During the past 10 years more interest has been shown, not only in Great Britain but in many parts of the world as well.

Palpable abnormalities in female breast is a common clinical problem but for practical reasons, excisional biopsy can not be used unrestrictedly. FNAB technique in such breast lesions is utilized with

success by various authors all over the world (Stewart, 1933; Adair, 1949; Cornillot and Verhaeghe, 1959; Zajdela, 1967; Cornillot et al, 1971; Duguid et al, 1979; Bequet & Kreutzer, 1981; Malberger et al, 1981).

Clinical examination of salivary swellings is far less accurate than breast lumps (Patey & Hand, 1952; Shaw & Friedmann, 1969; Von Hamm, 1962; Maynard, 1967; Thackray & Lucas, 1974).

With the help of FNAB salivary surgery has been precise, difficult per-operative decision over incisional and frozen section biopsy are avoidable.

In thyroid, single nodule has always given difficulty in clinical diagnosis. FNAB has been utilized with reasonable success in, not only diagnosing these nodules but other lesions of thyroid as well. Now FNAB is a routine procedure in the pre-operative work-up of goitre cases all over the world (Tempke et al, 1948; Soderstrom, 1952).

In abdomen, though FNAB was infrequently done in the past due to various reasons but now it is being slowly & gradually utilized in order to diagnose the various organomegalies and lumps and many times the information obtained by FNAB technique is invaluable (Smith, 1969; Zach, 1972; Wassastjerna, 1979; Sherlock, 1981).

This procedure in the abdomen & retro-peritoneal mass has been found to be fairly safe & is usually free from any complication.

Utility of FNAB in soft tissue lesions has been surprisingly good & has been found to be an additional, useful pre-operative investigation for an ultimate management of these cases (Stout and Lattes, 1967; Mackenzie, 1975).

Even in deeply situated regions like prostate FNAB can obtain diagnostic material with reasonable success and is now been practiced by various authors & recommended for its general use (Esposito, 1966, 1971; Stachler et al, 1975).

Regarding testis, the scope of FNAB is slightly limited. FNAB of testis favourably reported for the cases of infertility but regarding the diagnosis of suspected primary testicular tumours, the opinion is divided. In scandinavia, the procedure is accepted with a very fine needle, though there is a little risk of local tumour recurrence or metastasis to regional lymph nodes. However, the other school of thought advised against the procedure.

In fact, FNAB technique is now been practically possible, is being utilized for pre-operative

diagnosis of swellings foundany where in the body, provided the lesion is accessible.

The procedure to obtain cellular material from the lesion concerned, is fairly simple & easy to perform. It requires only a needle and the syringe for obtaining the material under vaccum and glass slides for making the smear and a fixative to preserve. After papanicolaou staining, the smear is ready for examination.

To assess the accuracy of this simple technique in our set up, this present study was planned & has been conducted.

This present study was conducted on 111 patients, having swellings in various regions of the body who attended M.L.B. Medical College, Hospital, Jhansai between June 1987 to July 1988. The majority of our cases were females and about 27.93% belonged to breast lump cases, 23.43% belonged to lymph nodes enlargement, 22.53% belonged to abdominal lumps and rest were of Goitres, salivary gland swelling, soft tissue tumours and miscellaneous.

Out of 111 cases, we not failed aspiration in only 9 cases giving rise to positive aspiration in as much as 92% of cases.

When we compared our FNAB diagnosis with conventional histopathological diagnosis which was possible in as many as 96 out of 111 cases, our FNAB diagnosis was accurate in as many as approximately 96% of the cases.

We did not meet any complication in any case studied by us.

In our present study, we have concluded that the FNAB technique is easy to perform, least expensive, most practical and fairly accurate in the diagnosis of various swellings. This procedure is usually not met with any complication even in deeply situated lesions like abdominal lump, prostate & thyroid etc. and fear in the past about this was unfounded.

Our observation has been found totally with the figures of various authors all over the world. The literature on the subject has been extensively reviewed.

Based on our findings & comparability with the figures of various authors, the procedure is recommended for its general use.